NATURAL REGENERATION POTENTIAL OF TREE FLORA AT BANGABANDHU SHEIKH MUJIB SAFARI PARK (BSMSP), DULAHAZARA, COX’S BAZAR, BANGLADESH

Uddin, M. I. U., S. S. Gupta, M. N. Ali and M. K. Hossain*

Institute of Forestry and Environmental Sciences, University of Chittagong, Chattogram - 4331

*Corresponding author: mkhossain2009@gmail.com

Abstract

The aim of this study was to evaluate the natural regeneration status of tree flora at Bangabandhu Sheikh Mujib Safari Park (BSMSP) in Dulahazara, Cox’s Bazar. Six blocks were created within the safari park to explore regeneration potential. A total of 41 sample plots of 5m × 5m size, each centered in the middle of a 20m × 20m vegetation survey plot, was taken. In total, 835 seedlings representing 56 tree species under 29 families were recorded. Euphorbiaceae was the dominant family with 8 species followed by Myrtaceae (6 species) and Combretaceae (4 species). The highest Family Relative Density (FRD) was represented by Myrtaceae (26.95%) followed by Euphorbiaceae (16.05%) and Dipterocarpaceae (12.93%). Euphorbiaceae showed the maximum Family Relative Diversity Index FRDI (14.29%) followed by Myrtaceae (10.71%) and Combretaceae (7.14%). The highest Family Importance Value Index (FIVI) was observed in Myrtaceae (37.66%), whereas Euphorbiaceae and Dipterocarpaceae represented 30.33% and 18.29%, respectively. Species in the order of descending value of Importance Value Index (IVI) were Syzygium fruticosum (24.10), Aporosa wallichii (12.30), Dipterocarpus costatus (12.10), Dipterocarpus alatus (11.60) and Fernandoa adenophylla (11.60). The regeneration percentage of seed-originated individuals was 72%, whereas the rest 28% individuals were from coppices. The onset of safe guard and preserve trees with proper management could contribute conserving native gene pool contribution to ecotourism.

Key words: Dulahazara safari park; Natural regeneration; Regeneration potential; Family importance value index.

INTRODUCTION

Natural regeneration is a biological process that naturally regulates the reproduction of plant genetic resources in a forest habitat and it involves the establishment of a new forest from self-sown seeds, coppices and root-suckers. Assessing regeneration is a reliable method for assessing the health of the forest as a whole and can immediately reveal changes in the ecosystem’s patterns (Rahman et al. 2011, Wang et al. 2008). The natural regeneration process determines how a plant community develops and evolves which has significant effects on the structure of forests (Han and Wang 2002). Furthermore, natural regeneration in forests is essential for the conservation and maintenance of floral diversity (Hossain et al. 2004). Moreover, research on the regeneration status allows for the prediction of the structure and pattern of tree species’ populations (Demel 1996, Dhaulkhandi et al. 2008, Nur et al. 2016). Plants maintain and expand their populations in time and space by the process of regeneration. Regeneration is a complex ecosystem process involving asexual and sexual reproduction, dispersal and establishment in relation to environmental factors (Barnes et al. 1998). However, the pattern of population structure of woody plants can show the regeneration profile, which is used to determine their regeneration status (Taketay 1996). Seedling data can help to predict the Assisted Natural Regeneration (ANR) potential of a forest ecosystem and more research is required to develop simple and effective survey protocols and site assessment indices (Hardwick et
There is a need for long-term monitoring of permanent plots where the initial seedlings’ conditions of regenerating tree and shrub species is assessed by some variables, like density, frequency, importance value index, diversity indices etc.

Bangabandhu Sheikh Mujib Safari Park (BSMSP) at Dulahazara, Chakaria, Cox’s Bazar is the first Safari Park in Bangladesh which started its journey in the 1998-99 fiscal year. In the past, different native trees and wildlife species were found in Dulahazara. Unfortunately, a good number of native plant species and wild animals are disappearing due to human population expansion, urbanization, illicit felling, disappearance of mother trees, encroachment of forest lands, land-use conflicts, etc. The safari park was established with a view to protect the valuable indigenous rare plants and wild animals accompanied by the promotion of tourism, education, and research facilities. Exploring the pattern of natural regeneration is essential to conserve and restore these valuable indigenous species. No research work has yet been conducted to investigate the regeneration potential of trees in this park. Hence, the present study was carried out to explore the natural regeneration status of tree flora at Bangabandhu Sheikh Mujib Safari Park (BSMSP), Dulahazara, Cox’s Bazar, Bangladesh.

**MATERIAL AND METHODS**

**Study area**

Bangabandhu Sheikh Mujib Safari Park (BSMSP) is located in Chakaria upazila under Cox’s Bazar district. It was established in 1996 on the previously declared reserve forest land of Fashiakhali Forest Range. The park lies beside the Chittagong-Cox’s Bazar Highway, 47 km north of Cox’s Bazar town. It encompasses an area of 900 hectares (Masum et al. 2012). The safari park is under the jurisdiction of the Wildlife Management and Nature Conservation Division, Chittagong and lies between 20°50´-21°50´ North latitude and 92°00´- 92°15´ East longitude. The Mean Annual Rainfall (MAR), Average Annual Humidity (AAH), and Mean Annual Temperature (MAT) were recorded as 1740.8 mm, 79.3% and 26.60°C, respectively at BSMSP (Uddin and Misbahuzzaman 2007). The topography of BSMSP is undulated hilly landscape with evergreen and semi-green tree coverage. Many depressions, narrow valleys and perennial natural streams flowing inside the park contain good quality water throughout the year. This park is enriched with native diversified flora as well as wild, semi-wild, and captive wild animals. Some ornamental plants also exist there (Hossen et al. 2014).

**Method of data collection**

A complete random block sampling method was followed to get accurate information about tree regeneration potential and species composition. The entire area was divided into six randomly selected blocks. A total of 41 regeneration plots of 5m × 5m size, each located at the center of a larger 20m × 20m vegetation survey plot, were taken from the aforementioned 6 blocks. The number of plots in each block was proportional to the size of block. Hence, 6 plots were from Old deer-breeding center, 3 from Tiger enclosure, 4 from Lion enclosure, whereas Asian and African herbivorous animal roaming zone, Elephant enclosure, Grazing land and plantation zone had 9, 12, 7 plots, respectively. Seedlings with dbh of ≤ 2 cm were counted and recorded. A Ground Positioning System (GPS) device was used to record the location of each sample plot for future monitoring (Fig. 1).
Data analysis

The quantitative structure of species was calculated using the following formulae:

a. Relative density (RD) of a species (Dallmeier 1992)
\[ RD = \frac{\text{Total no. of individuals of the species}}{\text{Total no. of individuals of all species}} \times 100 \]

b. Frequency of a species (Shukla and Chandel 2000)
\[ F = \frac{\text{Total no. of quadrats in which the species occurs}}{\text{Total no. of quadrats studied}} \times 100 \]

c. Relative frequency (RF) of a species (Dallmeier 1992)
\[ RF = \frac{\text{Frequency of the species}}{\text{Sum of all frequencies}} \times 100 \]

d. Abundance of a species (Shukla and Chandel 2000)
\[ A = \frac{\text{Total no. of individuals of a species in all the quadrats}}{\text{Total no. of quadrats in which the species occurs}} \]

e. Relative abundance (RA) of a species (Misra 1968)
\[ RA = \frac{\text{Abundance of the species}}{\text{Sum of abundances of all the species}} \times 100 \]

f. Importance Value Index (Misra 1968)
\[ IVI = RD + RF + RA \]

Different biodiversity and richness indices, Family Relative Density and Family Relative Diversity were calculated using the following formulae:

1. Species diversity index (Odum 1971), \( SDi = \frac{S}{N} \)
2. Shannon-Wiener’s diversity index (Michael 1984), \( H = - \sum_{i=1}^{n} P_i \ln P_i \)
3. Shannon’s maximum diversity index (Kent 2011), \( H_{\text{max}} = \ln S \)
4. Species evenness index (Pielou 1966), \( E = \frac{H}{\ln S} \)
5. Margalef’s diversity index (Margalef 1958), \( R = \frac{S-1}{\ln N} \)
6. Simpson’s diversity index (Simpson 1949), \[ D = \sum_{i=1}^{n} p_i^2 \]
7. Dominance of Simpson’s index (Magurran 1988), \[ D' = 1 - D \]
8. Simpson’s reciprocal index (Keller 2000), \[ D_r = \frac{1}{D} \]
9. Family relative density (Siddiqui et al. 2021), \[ FRD (\%) = \frac{N_f}{T_1} \times 100 \]
10. Family relative diversity index (Siddiqui et al. 2021), \[ FRDI (\%) = \frac{N_s}{T_3} \times 100 \]
11. Family importance value index (Siddiqui et al. 2021), \[ FIVI = FRD + FRDI \]

Here,
\[ S = \text{Total number of species} \]
\[ N_f = \text{No. of individuals in a family} \]
\[ N = \text{Total No. of individuals of all the species} \]
\[ P_i = \frac{\text{No. of individuals of one species}}{\text{Total no. of individuals}} \]
\[ T_1 = \text{Total no. of individuals} \]
\[ N_s = \text{No. of species} \]
\[ T_3 = \text{Total no. of species} \]

RESULTS AND DISCUSSION

Natural regeneration status in Bangabandhu Sheikh Mujib Safari Park

A total of 835 seedlings of 56 species under 29 families was recorded (Table 1). The dominant family was Euphorbiaceae with 8 species followed by Myrtaceae (6 species) and Combretaceae (4 species).

Table 1. Naturally regenerated seedlings and family in Bangabandhu Sheikh Mujib Safari Park along with their uses.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Family</th>
<th>Local name</th>
<th>Uses*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia auriculiformis</td>
<td>Mimosaceae</td>
<td>Akashmoni</td>
<td>F, N, T</td>
</tr>
<tr>
<td>Acrocarpus fraxinifolius</td>
<td>Caesalpiniae</td>
<td>Mandania</td>
<td>T</td>
</tr>
<tr>
<td>Anogeissus acuminata</td>
<td>Combretaceae</td>
<td>Sikori</td>
<td>N, T</td>
</tr>
<tr>
<td>Antidesma acidum</td>
<td>Euphorbiaceae</td>
<td>Elena</td>
<td>M, Fd</td>
</tr>
<tr>
<td>Antidesma ghaesembilla</td>
<td>Euphorbiaceae</td>
<td>Khudi Jam</td>
<td>M, N</td>
</tr>
<tr>
<td>Aporosa wallichii</td>
<td>Euphorbiaceae</td>
<td>Duddh Kuruch</td>
<td>M</td>
</tr>
<tr>
<td>Azadirachta indica</td>
<td>Meliaceae</td>
<td>Neem</td>
<td>M, N</td>
</tr>
<tr>
<td>Bombax insignae</td>
<td>Bombaceae</td>
<td>Bon Tula</td>
<td>N</td>
</tr>
<tr>
<td>Calophyllum inophyllum</td>
<td>Clusiaceae</td>
<td>Punnyal</td>
<td>M, N, T</td>
</tr>
<tr>
<td>Cassia fistula</td>
<td>Caesalpiniae</td>
<td>Sonalu</td>
<td>Fd, M, N,T</td>
</tr>
<tr>
<td>Castanopsis indica</td>
<td>Fagaceae</td>
<td>Shil batna</td>
<td>F, N</td>
</tr>
<tr>
<td>Chaetocarpus castanocarpus</td>
<td>Euphorbiaceae</td>
<td>Atailla</td>
<td>F</td>
</tr>
<tr>
<td>Cinnamomum iners</td>
<td>Lauraceae</td>
<td>Tez-bohu</td>
<td>M, T</td>
</tr>
<tr>
<td>Didymosperma gracilis</td>
<td>Areaceae</td>
<td>Bon Supari</td>
<td>N, M</td>
</tr>
<tr>
<td>Dillenia indica</td>
<td>Dilleniaceae</td>
<td>Chalta</td>
<td>Fd, M, T</td>
</tr>
<tr>
<td>Dillenia pentagyna</td>
<td>Dilleniaceae</td>
<td>Hargeza</td>
<td>F, T</td>
</tr>
<tr>
<td>Dimocarpus longan</td>
<td>Sapindaceae</td>
<td>Ashphal</td>
<td>Fd, N, M</td>
</tr>
<tr>
<td>Dipterocarpus alatus</td>
<td>Dipterocarpaece</td>
<td>Doilla Garjon</td>
<td>M, T</td>
</tr>
<tr>
<td>Dipterocarpus costatus</td>
<td>Dipterocarpaece</td>
<td>Baitta Garjon</td>
<td>F, N, T</td>
</tr>
<tr>
<td>Dipterocarpus turbinatus</td>
<td>Dipterocarpaece</td>
<td>Teli Garjon</td>
<td>N, T</td>
</tr>
<tr>
<td>Elaeocarpus tectorius</td>
<td>Euphorbiaceae</td>
<td>Jalpai</td>
<td>Fd, T</td>
</tr>
<tr>
<td>Fernandoa adenophylla</td>
<td>Bignoniaceae</td>
<td>Kala oisha</td>
<td>M</td>
</tr>
</tbody>
</table>
Each of the families Dipterocarpaceae, Fagaceae, Sapindaceae, and Verbenaceae was represented by 3 species. Other families have only 1 or 2 species each (Table 2). Myrtaceae demonstrated the highest (26.95%) Family Relative Density (FRD) followed by Euphorbiaceae (16.05%) and Dipterocarpaceae (12.93%). Maximum (14.29%) Family Relative Diversity Index (FRDI) was shown by Euphorbiaceae, whereas Myrtaceae and Combretaceae had 10.71% and 7.14% FRDI, respectively. Family Importance Value Index (FIVI) was also found to be highest (37.66%) in Myrtaceae followed by Euphorbiaceae (30.33%) and Dipterocarpaceae (18.29%).

Table 2. Family-based orientation of regeneration parameters in Bangabandhu Sheikh Mujib Safari Park.

<table>
<thead>
<tr>
<th>Family</th>
<th>No. of species</th>
<th>No. of seedlings</th>
<th>FRD (%)</th>
<th>FRDI (%)</th>
<th>FIVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anacardiaceae</td>
<td>1</td>
<td>13</td>
<td>1.557</td>
<td>1.786</td>
<td>3.343</td>
</tr>
<tr>
<td>Apocynaceae</td>
<td>1</td>
<td>7</td>
<td>0.838</td>
<td>1.786</td>
<td>2.624</td>
</tr>
<tr>
<td>Arecaceae</td>
<td>1</td>
<td>2</td>
<td>0.240</td>
<td>1.786</td>
<td>2.025</td>
</tr>
<tr>
<td>Bignoniaceae</td>
<td>1</td>
<td>39</td>
<td>4.671</td>
<td>1.786</td>
<td>6.456</td>
</tr>
<tr>
<td>Bixaceae</td>
<td>1</td>
<td>2</td>
<td>0.240</td>
<td>1.786</td>
<td>2.025</td>
</tr>
<tr>
<td>Bombacaceae</td>
<td>1</td>
<td>1</td>
<td>0.120</td>
<td>1.786</td>
<td>1.905</td>
</tr>
<tr>
<td>Caesalpinaceae</td>
<td>1</td>
<td>4</td>
<td>0.479</td>
<td>1.786</td>
<td>2.265</td>
</tr>
<tr>
<td>Clusiaceae</td>
<td>2</td>
<td>25</td>
<td>2.994</td>
<td>3.571</td>
<td>6.565</td>
</tr>
</tbody>
</table>

*F = Fuel wood, Fd = Food and Fodder, M = Medicinal, N = Multiple non-timber uses (other than fuel, food, fodder and medicine), T= Timber
Table 3. Relative Density (RD), Relative Frequency (RF), Relative Abundance (RA) and Importance Value Index (IVI) of regenerating tree species recorded from BSMSP.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>RD (%)</th>
<th>RF (%)</th>
<th>RA (%)</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia auriculiformis</td>
<td>0.48</td>
<td>0.78</td>
<td>1.26</td>
<td>2.52</td>
</tr>
<tr>
<td>Acrocarpus fraxinifolius</td>
<td>0.72</td>
<td>0.39</td>
<td>3.77</td>
<td>4.88</td>
</tr>
<tr>
<td>Anogeissus acuminata</td>
<td>1.32</td>
<td>0.78</td>
<td>3.46</td>
<td>5.56</td>
</tr>
<tr>
<td>Antidesma acidum</td>
<td>2.16</td>
<td>1.56</td>
<td>2.83</td>
<td>6.55</td>
</tr>
<tr>
<td>Antidesma ghaesembilla</td>
<td>0.24</td>
<td>0.39</td>
<td>1.26</td>
<td>1.89</td>
</tr>
<tr>
<td>Aporosa wallichii</td>
<td>5.39</td>
<td>4.3</td>
<td>2.57</td>
<td>12.3</td>
</tr>
<tr>
<td>Azadirachta indica</td>
<td>0.12</td>
<td>0.39</td>
<td>0.63</td>
<td>1.14</td>
</tr>
<tr>
<td>Bombax insigne</td>
<td>0.12</td>
<td>0.39</td>
<td>0.63</td>
<td>1.14</td>
</tr>
<tr>
<td>Calophyllum inophyllum</td>
<td>0.12</td>
<td>0.39</td>
<td>0.63</td>
<td>1.14</td>
</tr>
<tr>
<td>Cassia fistula</td>
<td>0.48</td>
<td>0.78</td>
<td>1.26</td>
<td>2.52</td>
</tr>
<tr>
<td>Castanopsis indica</td>
<td>1.2</td>
<td>1.95</td>
<td>1.26</td>
<td>4.41</td>
</tr>
<tr>
<td>Chaetocarpus castanocarpus</td>
<td>2.04</td>
<td>1.56</td>
<td>2.67</td>
<td>6.27</td>
</tr>
<tr>
<td>Cinnamomum iners</td>
<td>1.68</td>
<td>2.34</td>
<td>1.47</td>
<td>5.49</td>
</tr>
<tr>
<td>Didymosperma gracilis</td>
<td>0.24</td>
<td>0.39</td>
<td>1.26</td>
<td>1.89</td>
</tr>
<tr>
<td>Dillenia indica</td>
<td>0.84</td>
<td>0.78</td>
<td>2.2</td>
<td>3.82</td>
</tr>
<tr>
<td>Dillenia pentagyna</td>
<td>0.84</td>
<td>1.17</td>
<td>1.47</td>
<td>3.48</td>
</tr>
<tr>
<td>Dimocarpus longan</td>
<td>0.72</td>
<td>0.78</td>
<td>1.89</td>
<td>3.39</td>
</tr>
</tbody>
</table>
Dipterocarpus alatus 4.91 4.3 2.34 11.6  
Dipterocarpus costatus 5.03 5.08 2.03 12.1  
Dipterocarpus turbinatus 5.39 6.25 1.77 13.4  
Elaeocarpus tectorius 0.12 0.39 0.63 1.14  
Fernandea adenophylla 4.67 5.08 1.89 11.6  
Ficus benjamina 0.12 0.39 0.63 1.14  
Ficus hispida 3.23 2.73 2.43 8.39  
Firmiana colorata 0.12 0.39 0.63 1.14  
Flacourtia jangomas 0.48 0.39 2.52 3.39  
Garcinia cowa 2.87 3.91 1.51 8.29  
Glochidion lanceolarium 0.36 0.78 0.94 2.08  
Grewia nervosa 4.07 4.3 1.94 10.3  
Holarrhena antidysenterica 0.84 1.17 1.47 3.48  
Lepisanthes rubiginosa 1.2 1.56 1.57 4.33  
Lepisanthes senegalensis 1.08 1.56 1.41 4.06  
Lithocarpus polystachya 2.51 1.95 2.64 7.11  
Lithocarpus thomsonii 1.92 2.34 1.68 5.94  
Maesa indica 4.55 4.69 1.99 11.2  
Mangifera sylvatica 1.56 2.73 1.17 5.46  
Michelia champaca 0.12 0.39 0.63 1.14  
Mitragyna parvifolia 0.84 0.78 2.2 3.82  
Phyllanthus emblica 2.63 3.13 1.73 7.49  
Pithecellobium angulatum 0.48 0.39 2.52 3.39  
Syzygium claviflorum 2.63 1.95 2.77 7.35  
Syzygium cumini 1.2 0.39 6.29 7.86  
Syzygium firmum 4.43 4.3 2.12 10.8  
Syzygium fruticosum 13.5 5.86 4.74 24.1  
Syzygium jambos 0.72 0.78 1.89 3.39  
Syzygium praecox 4.43 3.91 2.33 10.7  
Terminalia bellirica 1.2 2.34 1.05 4.59  
Terminalia chebula 1.32 1.56 1.73 4.61  
Terminalia citrina 0.24 0.39 1.26 1.89  
Theopsea populnea 0.24 0.39 1.26 1.89  
Vitex glabrata 0.24 0.39 1.26 1.89  
Vitex peduncularis 1.08 1.56 1.41 4.06  
Vitex pinnata 0.12 0.39 0.63 1.14  
Bixa orellana 0.24 0.78 0.63 1.65  
Xanthophyllum andamanicum 0.12 0.39 0.63 1.14  
Ziziphus mauritiana 0.48 0.78 1.26 2.52  

| Total | 100 | 100 | 100 | 300 |

**Regeneration mode**

Out of the total 835 individuals, 602 individuals (72%) of seed-origin and 233 (28%) were of coppice origin (Fig. 2).

![Fig. 2. Regeneration mode of the regenerating trees in BSMSP.](image)
Biodiversity indices for regeneration status of trees at BSMSP

The value of the Species Diversity index (SDi) for the entire survey area was 0.067. The Shannon-Wiener’s diversity index (H) for the area was 3.440 with Shannon’s maximum diversity index (H_{max}) of 4.025. Species evenness index (E) and Margalef’s diversity index (R) were 0.855 and 8.175, respectively. The Simpson’s diversity index (D) was 0.046 with Dominance of Simpson’s index (D’) of 0.954 and Simpson’s reciprocal index (D_r) of 21.585 (Fig. 3). The lower value of Simpson’s index indicates diversified tree species in the studied area. The values of Shannon-Wiener’s and Margalef’s diversity indices also indicate the remarkable presence of tree species in the study area.

Ecosystem restoration is a process of reversing the degradation of forest ecosystems to regain their ecological functionality to improve the productivity and capacity of ecosystems to meet the needs of society. This can be done by allowing the natural regeneration of over-exploited ecosystems or by planting trees and other plants (UNEP 2019). Natural regeneration potential is a critical criterion for all forest ecosystems. However, the regeneration status of tree species at BSMSP is little documented. Individuals of only 56 naturally regenerating species under 29 families were recorded. The number of natural regenerations is much lower than that of other similar forests in Bangladesh. A total of 120 naturally regenerating tree species has so far been identified in the natural forests of Dudhpukuria-Dhopachari Wildlife Sanctuary (Hossain et al. 2004a). Hazarikhil Wildlife Sanctuary (HWS) in Chittagong North Forest Division has 90 naturally regenerating tree species (Rahman et al. 2019) whereas the number is 105 in Chunati Wildlife Sanctuary (Rahman et al. 2020). Natural regeneration of tree species in the natural forests of Chittagong South Forest Division represents 64 tree species with average seedlings of 24,767 per ha in comparison to 40 tree species and 18,633 seedlings per ha in enrichment plantations (Hossain et al. 2004b). However, the number of regenerating tree species at BSMSP is greater than that of Khadimnagar National Park and Tilagor Eco-Park (55 tree species) (Rahman et al. 2011), Tankawati Natural Forest of Chittagong South Forest Division (29 tree species) (Motaleb and Hossain 2011), and Durgapur hill forest of Netrokona (27 tree species) (Rahman et al. 2011). Disturbances in natural forests can modify the habitat appropriateness for plant species, influencing ecosystem functioning and plant species composition (Berhane et al. 2013, Wilcox et al. 2006). The Importance Value Index (IVI) indicates which species
dominates in a mixed population (Das et al. 2018). High IVI values for natural regeneration of Syzygium fruticosum (24.10), Aporosa wallichii (12.30), Dipterocarpus costatus (12.10), and Dipterocarpus alatus (12.10), was found in the present investigation. It may be attributed to the greater dispersal capabilities of seeds, pollen grains, and other reproductive organs of these species via the agents like wind, animals, water, bats, humans, birds, etc. However, high IVI values for Protium serratum (50.09) and Bombax ceiba (39.37) were found in Rampahar Natural Forest Reserve within Rangamati South Forest Division (Chowdhury et al. 2018). Seed-originated individuals were 72% in BSMSP, whereas 89% was reported from Babupara VCF and 78% from Renikhayong para VCF of Bandarban district (Kamruzzaman et al. 2018, Jannat et al. 2020).

Fig. 4. Dipterocarp dominant natural forests of Bangabandhu Sheikh Mujib Safari Park at Dulahazara, Cox’s Bazar, Bangladesh.

Species richness is one of the most essential factors for establishing a localized value for biodiversity conservation. The higher the value of diversity, the more stable a community (Jannat et al. 2020, Khumbongmayum et al. 2005). The Species Diversity index (SDi) value for the entire study area was 0.067. Shannon’s maximum diversity index (H_{max}) was 4.025 while the Shannon-Wiener’s diversity index (H) was 3.440. The Species evenness index (E) and Margalef’s diversity index (R) were 0.855 and 8.175 correspondingly. Simpson’s diversity index (D) was 0.046, Simpson’s dominance index (D’) was 0.954, and Simpson’s reciprocal index (D_r) was 21.585. Species diversity index (0.01), Species richness index (4.92), Shannon-Wiener’s index (3.62), Shannon’s maximum diversity index (3.62), Species evenness index (2.26), Simpson’s index (0.03), and Dominance of Simpson’s index (0.97), reported from the biodiversity conservation areas of northeastern Bangladesh (Rahman et al. 2011), are supported by the present findings.

Bangabandhu Sheikh Mujib Safari Park is Bangladesh’s pioneer safari park (Fig. 4) and has one of the most enrich ecosystems with tremendous regeneration potential. Even though a boundary wall guards against the extreme threat of anthropogenic disturbances, species extinction is being accelerated by the illegal activities of some of the local inhabitants. Wild animals of the park have a
range of impacts on plant regeneration including browsing and seed predation etc. However, this study identifies 56 tree species having significant regeneration potentials with 20,875 seedlings per hectare. The park is the habitat of native species including mother trees of *Dipterocarpus costatus*, *Dipterocarpus turbinatus*, *Dipterocarpus alatus*, *Aporosa wallichii*, *Syzygium fruticosum*, *Fernandoa adenophylla*, *Macaranga denticulata*, *Grewia nervosa*, *Mallotus philippensis* etc. The moment has finally come to adequately safeguard, preserve, and manage the park in order to protect and conserve the gene pool of native and introduced plant species. The park, not to be exaggerated, is contributing to our ecotourism sector and acting as a working ground for researchers and educators.

REFERENCES


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